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of them, including a horn-core and posterior part of the skull (Plate XXXII., fig. 8). These fragments were also found in the Laramie bed of Montana, probably at no great distance from those described by Prof. Marsh. I did not determine the genus to which this cranium should be referred, since there were already known nine genera of Dinosauria from the same horizon to one or the other of which, it was sure to belong. The observations of Prof. Marsh will determine this point. The affinity to Hypsirhophus referred to by Prof. Marsh indicates Polyonax (Cope) as the form to which the species probably belongs, although this is of course a mere surmise. That genus was described from vertebræ and limb and dermal bones (Cretaceous Vertebrata U. S. Geol. Survey Terri., II., p. 63, Plates II. and III.). Some of the latter were probably identified with doubt as parts of the shafts of limb bones, but they resemble more nearly some of the spinous dermal bones ascribed to Hypsirhophus by Marsh.

It would have been well if the final publications of the Hayden Survey could have been completed by the Director who succeeded him in charge, instead of new publications taken up. In that case the continued duplication of the work of the first survey by its successor could have been avoided.—*E. D. Cope.*

MINERALOGY AND PETROGRAPHY.[1]

Petrographical News.—Löwinson-Lessing[2] has suggested a scheme for the classification of elastic rocks. He would divide these into tuffs, breccias, conglomerates, pseudoschists and slaty rocks. Tuffs he would confine to rocks made up of crystals, or pieces of crystals, and separate minerals, and would subdivide into agglomerates-tuffs (subaëreal) and tuffogenous sediments (submarine). The agglomeratic tuffs he would further separate according to structure. Tuff-like rocks produced from crystalline rocks by orodynamic forces, or by weathering, he would call tuffoids, and distinguish as elasto-tuffs and decomposition-tuffs (Verwitterungs tuffen). The breccias are composed of pieces of rocks cemented by rock material. They are divided into primary, or volcanic, and secondary, or metasomatic breccias. The volcanic breccias include the lava agglomerates (Reibung's breccias), composed of pieces of foreign rock, or of the crust of a lava stream, which have been cemented together by a molten rock, and tuff-lavas (Spaltung's breccia), those produced by the separating from a molten magma of certain portions, and their consolidation into a rock mass by the cooling of the remaining portion. Both of these classes are again subdivided according to structure. The conglomerates include the conglomerates proper, psammite (a micro-conglomerate) and sandstone (when the microscopical grains are those of single minerals). The pseudoschists are metamorphosed sediments, breccias, or tuffs in which the line between the fragments and the cement has partially disappeared. The slates have the same signification as at present. —The basalt forming two hills near the village of Grossdehsaer, west of Löbau, in Saxony, contains numerous inclusions of granite which possess features of great interest. The basalt is composed of a mesh of augite crystals and a little glass, in which porphyritic augites, olivine, magnetite and a little plagioclase are imbedded. It contains also little veins of a colorless substance, with the chemical properties of nepheline. The basalt in breaking through the underlying granite brought pieces of the rock with it to the surface. The changes which have been produced in these included fragments and the effect which they in turn have produced in the basalt, are the occasion of a recent paper by Beyer.[1] The inclusions are divided into the porphyritic and glassy varieties. The basalt first disintegrated the granite, and then separated the broken fragments into their constituent minerals. These were then partially dissolved —the mica disappeared entirely and magnetite and spinel were developed; in the vicinity of feldspar new feldspathic material crystallized; the quartz was corroded and around its edges a light colored augite was formed. In the porphyritic inclusions remains of quartz and feldspar are still to be found; in the glassy ones all traces of the original minerals have disappeared, the composition of the glass alone remaining as proof of the granitic character of the inclusion. The effect of the inclusions upon the basalt is seen in the disappearance of the olivine, and the development in its stead of a brown glass surrounded by augite crystals. In the more acid portions feldspar has separated and has included many microlites of augite within itself. While these changes were going on in the granite and basalt, steam escaped from the mass of rock and produced a slaggy condition in the glass inclusions, and new minerals which are implanted in the walls of the cavities. In one case little colorless hexagonal crystals have the composition:—

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[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.

[2] Miner. u. Petrog. Mitth., ix., p. 528.

SiO_2	Al_2O_3	CaO	MgO	K_2O	Na_2O	H_2O
57.50	18.11	4.63	1.20	6.98	2.40	10.48.

—The islands off the coast of Morbihan, France, contain strata of schistose pyroxene rocks, interbedded with archæan gneisses and mica-schists. They consist of sphene, garnet, green pyroxene, plagioclase, quartz, mica and pale hornblende in large crystals. Vesuvianite and zircon also occur in them in small quantity. The pyroxene, comprising the larger part of the rock, is of a light green color, and possesses the diallagic parting. The plagioclase—labradorite and anorrhite—is present in large quantity in some varieties of the rock, and always shows a tendency to alter into wollastonite. The hornblende and quartz are both secondary. These pyroxenites resemble very closely the flaser-gabbros of the Germans, but are supposed by Barrois[1] to be metamorposed limestones. He describes a limestone in contact with granite in the same region, in which the minerals characteristic of the pyroxenites have been developed.—Chrustschoff[2] includes under the name perthitophyre a series of dyke rocks occurring in the Department Volhynia, Russia, whose characteristics differ from those of any rocks heretofore described. They consist of an interstitial micropesthitic substance, in which various amounts of idiomorphic quartz, labradorite, monoclinic and orthorhombic augite, olivine, and other minerals are imbedded. In the coarser varieties the iron-bearing minerals are not abundant, while in the finer grained kinds they are in as large quantity as the feldspar. In the course of his article the author describes parallel growths of diallage and acicular crystals of an orthorhombic pyroxene, and also an apparently triclinic pyroxene. He also mentions the existence of anatase as an inclusion in the feldspar and quartz, and gives in brief the properties of a mineral whose nature he is unable to determine.—Sandberger[3] describes inclusions of hypersthenite, olivine-gabbro, and a rock composed of olivine, arfvedsonite, picotite, eustatite, sanidine and augite, from the phenolite of Heldburg, in the Thüringer Wald.—Posepuy[5] gives brief descriptions of a few sections of adniole in the course of an article discussing the structure of the well-known mining region in the vicinity of Przibram, Bohemia.

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[1] Miner. u. Petrog. Mitth., x., p. 1.

AMERICAN MINERALS.—A series of analyses[4] of *beryl* from Norway, Maine and Willemantic and Litchfield counties, Ct., seems to show that beryllium and the alkalies mutually replace each other in this mineral, and that water is a constant constituent. An analysis of *phenacite* from Florissant, Col., gave practically no alkalies. The barium feldspar (*cassinite*) from Bene Hill, Delaware county, Pa., first analyzed by Genth,[5] has been re-examined by

[1] Barrois: Ann. d. l. Soc. Geol. du Nord., xv., p. 69.
[2] Miner. und Petrog. Mitth., ix., p. 470.
[3] Neues Jahrb. f. Min., etc., 1888, ii., p. 24.
[4] Miner. u. Petrog. Mitth., x., p. 175.
[5] Report Min. Penn., 1866, p. 224.

Penfield and Sperry,[1] and found to have the composition:—

SiO_2	Al_2O_3	Fe_2O_3	CaO	Na_2O	BaO	K_2O	Ign.
62.95	19.82	.17	.25	4.01	3.95	8.57	.11

a result agreeing very closely with that of Genth. The authors regard the substance as a mixture of 35.23 per cent. albite, 51.15 of orthoclase, and 13.17 of hyalophane. The microscopical examination of its thin sections reveals the presence of albite lamellæ ntergrown with orthoclase, but does not show the hyalophane. analyses of *monazite* from Alexander county, N. C., of sussexite from Franklin, N. J., and of a very pure phlogopite from Edwards, St. Lawrence county, N. Y., are given in the same article.—Wülping[2] has used the results obtained by Riggs[3] in his careful analyses of tourmaline, to determine a general formula for the composition of this complex mineral. By reducing the amounts of the various substances found by Riggs to their equivalents in SiO_2, B_2O_3, Al_2O_3, MgO, Na_2O and H_2O, Wülping[5] concludes that the mineral may be represented as a compound of the molecules 12 SiO_2, 3 B_2O_3, 8 Al_2O_3, 2 Na_2O, 4 H_2O, and 12 SiO_2, 3 B_2O_3, 5 Al_2O_3, 12 MgO, 3 H_2O, in various proportions.—Crystals of *phenacite* from Mt. Antero, Col., present two habits. Those found in quartz or beryl consist essentially of rhombohedra of the third order, combined with prisms of the second order, while those attached to orthoclase show in addition a prism of the first order. The rhombohedral faces are dull, and the prismatic faces are vertically striated. Twin crystals of quartz with P_2 as the twinning plane are also described. —A remarkable variety of *oligoclase* from near Bakersville, N. C., is described by Kunz[6] as perfectly transparent. It has a faint green tinge, and contains cavities surrounded by tufts of white acicular microlites, like the glass that often solidifies in the bottoms of glass pots. It has the usual perfect cleavage of oligoclase, but is not striated. According to Messrs. Penfield and Sperry,[7] the optical properties of the mineral are abnormal. Sections parallel to oP show a positive extinction of 39°–40°. Those parallel to $_{\infty}P'_{\infty}$ remain dark during an entire revolution between crossed nicols, but in converged light yield an optical axis in the centre of the field instead of a bisectrix. The same writer calls attention to *quartz* pseudomorphs after spodumene from Peru, Me.; pseudomorphs of *iron oxides* after aragonite from Puma Co., Ariz., and beautiful transparent *cyanite* from Bakersville, N. C.—Crosby and Greeley have discovered that the brown massive mineral from Newbury, Mass., and regarded by Dana as garnet, is vesuvianite. It has a specific gravity of 3.55 and a composition :—

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[1] Amer. Jour. Sci., xxxvi., p. 317.
[2] Miner. u. Petrog. Mitth., x., p. 161.
[3] Amer. Naturalist, 1888, p. 250.
[4] Amer. Jour. Sci., xxxvi., p. 321.
[5] Ib., p. 222.
[6] Amer. Jour. Sci., xxxvi., p. 324.
[7] Technology Quarterly, May, 1888, p. 407.

SiO_2	Al_2O_3	FeO	CaO	MgO	K_2O	Na_2O	MuO_2	P_2O_5
35.93	14.77	8.91	39.46	.13	.44	.36	tr.	tr.

—A hard black mineral occurring at Rome, Mass., in little octahedra, has been examined by Crosby and Brown,[1] with sufficient accuracy to lead them to declare it gahnite.

MINERAL SYNTHESES.—Dollter[2] has effected the synthesis of a large number of *micas* by fusing together aluminium-bearing silicates and metallic fluorides. The hornblendes yielded biotite when fused with sodium and magnesium fluorides. The alumina-free hornblendes gave olivine or augite. Garnets yielded meroxane. Micas of different kinds were obtained by fusing K, Al, SiO_4 with sodium fluoride alone; or with this salt and potassium fluosilicate or magnesium silicate, with or without the addition of ferrous silicate. All the micas thus produced were decomposed when the temperature of the mass was raised to a white heat, and olivine, augite or scapolite were formed. Muscovite was obtained from andalusite by fusing it with potassium fluosilicate and aluminium fluoride, and zinnwaldite, when a little lithium carbonate was added to the mixture. Many other points of interest are found in the paper, which will undoubtedly prove of value in discussing the paragenesis of minerals in rock masses.—Among the other minerals produced artificially within the past few months, attention may be called to *rhodonite* and *tephronite,* which Gorgen[3] obtained by heating to a high temperature, in the presence of water vapor, a mixture of manganese chloride and precipitated silica. Wollastonite[4] was produced when calcium chloride was used instead of the manganese compound. *Barite, celestite* and *anhydrite* were obtained[5] by fusing the corresponding amorphous compounds in the chloride of some metal.—Bourgeois[6] fused metallic tin with copper oxide and got crystals of *cassiterite.*—Dufet[7] prepared *pharmacolite* by allowing solutions of calcium[8] nitrate and di-sodium arsenate to diffuse slowly into each other.

MISCELLANEOUS.—Julien believes that the rate of decomposition in pyrite depends upon the amount of marcasite present in it

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[1] Ib., p. 408.

[2] Min. und Petrog. Mitth., x., p. 67, and Neues Jahrb. f. Min., etc., 1888, ii., p. 178.

[3] Bull. Soc. Franç. d. Min., x., p. 264.

[4] Ib., x., p. 271.

[5] Ib., xi., p. 58.

[6] Ib., x., p. 284.

[7] Ib., xi., p. 187.

[8] Ann. N. Y. Acad. of Sci., iv., July, 1888.

Easily decomposable pyrite is not pure, but is intimately mixed with marcasite, probably in the most minute, *i.e.*, molecular condition. The more rapid alteration of marcasite is supposed to be due to the open structure of the mineral in consequence of the interlacing of twinned crystals, etc.—Mr. Dunnington[1] thinks that the origin of the massive oxides of manganese may be explained by reference to the well-known dissolving effect of sulphate solutions upon manganese compounds. The sulphates may easily have been derived by the decomposition of pyrites. This theory would account for the great depth at which certain deposits of manganese ores are found, and their concentration in masses.—In an article extending through several numbers of *Nature*, Lockyer[2] gives an interesting résumé of the state of our knowledge in regard to meteorites—their structure, composition and origin.—Rauff[3] announces the invention of a new rock slicing machine, and an instrument for cutting crystals parallel or perpendicular to any given natural face.

BOTANY.[4]

A FEW NOTABLE WEEDS OF THE NEBRASKA PLAINS.—In examining the constitution of various floræ one is struck by the fact that with the other changes there is a notable change in the weedy plants as well. Of course a "weed," from a botanical standpoint, is as reputable a plant as any other. It is in fact but an eminently successful organism in the struggle for place, and on this account it is to the botanist much more interesting than the ordinary plants which jog along in a mediocre way, neither advancing nor falling much behind under our observation. Upon the Nebraska plains, the plants which push themselves into place so prominently as to be called "weeds" by the farmer, are partly natives, and partly introduced species, some of which have come in from the southwest within a comparatively recent period, while others have come along with the tide of immigration from the eastern part of the continent, and from the old world.

The plant which, all things considered, is the worst weed, from the popular point of view, is doubtless the Sand-bur (*Cenchrus tribuloides* L.), a peculiar grass of variable habit. As mostly seen,

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[1] Amer. Jour. Sci., Sept., 1888, p. 175.

[2] Ib., Sept., 1888.

[3] Neues Jahrb. f. Min., etc., 1888, ii., p. 230.

[4] Edited by Prof Chas. E. Bessey, Lincoln, Neb.